1310003

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DRAWINGS ATTACHED

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(19)

(54) A ROOF WEATHERING SLATE WITH AN ELASTOMERIC COLLAR

(71) I, GEORGE WILLIAM BAMBROUGH, a British subject, trading as GEORGE BAMBROUGH ASSOCIATES, of 66 Kings Street, Southall, Middlesex, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement: —

This invention relates to a roof weathering slate with an elastomeric collar.

In accordance with the invention, a roof weathering slate comprises a roof flashing having a substantially flat metal base formed so that a pipe protruding from a roof can project therethrough, and a hollow elastomeric collar which is attached to said roof flashing and which, when said slate is mounted on such a roof, establishes a seal around the pipe.

A preferred form of roof weathering slate in accordance with the invention has a substantially flat metal flashing which is apertured so that the flashing can be mounted on a roof about a pipe protruding therefrom, and a hollow elastomeric collar for sealing around the pipe, said hollow elastomeric collar having at its lower end a radially outwardly extending annular flange and constituting therewith a one-piece moulding making an adhesional bond at said annular flange with the region of said substantially flat metal flashing around the aperture therein.

In order that the invention may be well understood, there will now be described several embodiments thereof, given by way of example only, reference being had to the accompanying drawings, in which: —

Figure 1 is a plan view of a roof weathering slate embodying the invention;

Figure 2 is a section along the line II—II of Figure 1;

Figures 3 and 4 are part sectional elevations also taken along the line II—II of Figure 1 and showing the elastomeric collar of the slate distorted to accept a 3 inch and a 4 inch pipe respectively; and

Figures 5 to 7 are views of details of alternative versions of roof weathering slates embodying the invention.

Referring first to Figures 1 to 4, the roof weathering slate comprises a metal flashing 1 and an elastomeric collar 2 secured thereto. The flashing 1 is preferably of aluminium or similar malleable metal, and the collar 2 of neoprene.

The flashing 1 comprises a substantially flat base 3 which is apertured at 4 and from which projects a hollow frusto-conical section 5 integral with the base.

The flashing base 3 is intended to rest on a roof with the elastomeric collar 2 surrounding and making a seal with an upstanding pipe protruding through the roof. In use, the rearward region 3*a* of the base would be overlaid with upper roofing tiles, and the forward base region 3*b* would overlie the lower tiles.

The collar 2 is also of generally frusto-conical configuration and is co-axial with the flashing section 5. A lower region 6 of the collar wall forms a continuation of the section 5 and rests thereon at a strengthened, thicker section 7 with a downwardly projecting rib 8 of the collar being firmly engaged in an upwardly open, annular recess 9 fashioned in the flashing section 5, the radially inner wall 10 which defines that recess being crimped against the rib 8.

The upper end of the collar wall region 6 is continued by an intermediate wall region 11 which gradually increases in diameter toward its upper extremity. In turn, the wall region 11 is continued by an upper wall region 12 which gradually decreases in diameter towards its upper end. An internal annular rib 13 is provided on the collar adjacent the upper end thereof to seal against the aforesaid upstanding pipe.

It is to be particularly noted that the internal diameter *d* of the collar at the junction J between its intermediate and upper wall regions 11 and 12 respectively is substantially equal to or slightly smaller than the outer diameter of the largest pipe section to be sealed against, whilst the internal diameter D of the

collar at the junction J1 between its lower and intermediate wall sections 6 and 11 respectively may be substantially equal to or slightly larger than the inner diameter of such a pipe. The significance f such dimensional relationships will appear hereinafter.

In a particular roof weathering slate capable of sealing against plastic pipes having internal diameters in the range between 3 inches and 4 inches, the internal diameter of the collar at the upper end thereof is 2.8 inches, the internal diameter *d* is 4.31 inches and the internal diameter *D* is 4.075 inches. It should be mentioned that 3 inch pipe has a nominal external diameter of 3.25 inches, and 4 inch pipe a nominal external diameter of 4.339 inches.

Moreover, the upper end of the collar is in a plane perpendicular to the collar axis and at an angle of 15° with the flashing base 3, the collar axis being at an angle of 75° with that base. Such a collar may be used with roofs having pitches between 25° and 55°.

When such a collar seals against a 3 inch pipe, then, as shown in Figure 3, the upper extremity thereof will deform locally to make sealing contact with the pipe P. So long as pipes no larger in external diameter than the inner diameter D are utilized, then it will be the upper wall region 12 of the collar which will deform into sealing engagement with the pipe, and the larger the pipe the greater the sealing area of collar in contact therewith. The tendency is for the collar to flex about the junction J between its intermediate 11 and upper 12 wall regions, so that it is the area of the collar at that junction which tends to be the most subjected to load and hence susceptible to fatigue.

If used with pipes of greater external diameter than diameter D but less than diameter *d*, not only is the upper collar wall region 12 flexed about the junction J but, additionally, the intermediate wall region 11 tends to flex about that junction J and also junction J1, so that again it is the junction areas which are loaded the most, the rest of the collar wall being relatively lightly loaded. Again, the greater the diameter of pipe, the more the sealing contact there is with the collar.

When the maximum diameter pipe is utilized, both the upper 12 and intermediate 11 collar wall regions are flexed about the junction areas J and J1, and particularly the former, to fully seal against the pipe P and in so doing extend parallel with the pipe axis, as shown in Figure 4.

In practice, the slate would tend to be used either with pipes of 3 inch or 4 inch nominal diameter subject to the usual tolerance limitations. When accommodating the smaller pipe only the outer end of the collar will tend to def rm, and sealing will occur with the pipe over the entire localised deformed area with the sealing rib 13 making particularly localised sealing contact. The collar wall is, thus, lightly loaded and its incidence to fatigue failure is minimal.

In use with a 4 inch pipe, the whole of the upper and intermediate collar wall regions, as stated, sealingly engage the pipe wall. However, because of the described profile of the collar, both those wall regions are lightly stressed since the necessary collar flexure occurs mainly about the discussed junction area J. Whilst, therefore, in the course of time, that localised area might tend to failure, since the sealing area is provided mainly by the collar regions on each side thereof, the seal will be virtually unaffected and effective to prevent leakage between the pipe and the collar.

As will now be appreciated, whilst the collar diameter *d* in the particular slate example is slightly smaller than the outer diameter of the 4 inch pipe, it could be substantially equal thereto, the important point being that sealing should obtain at that junction area J. Again, the collar diameter D should be sufficiently smaller than that pipe outer diameter so that sealing may take place over the whole of the extent of the collar wall region 11 with only attendant minimal stressing at the junction areas J and J1. To that end, the dimensional relationship hereinbefore mentioned is satisfactory.

If the collar is of neoprene, then since that material has a high elongation to break (good elasticity), the collar will have a particularly long life since it will be resistant to fatigue.

The collar can also seal to pipes of other than plastics material, for example cast iron.

An advantage of the slate being of the described composite construction is that it can be produced relatively cheaply with the metal flashings being pressings and the collars being, because of the relatively small size, injection mouldings.

Referring now to Figure 5, the roof weathering slate of Figures 1 to 4 is modified in that a moulded collar 2 of elastomeric material at its lower end makes an adhesional bond at 15 with an upward annular extension 14 on the metal base 3, that extension bounding the aperture 4.

Figure 6 shows a somewhat similar construction, but is supplemented by the collar 2 including at its lower end a flat, annular, radially outwardly extending flange 16 which is moulded in one piece with the collar and which makes an adhesional bond at 15 with the region of the metal base 3 around the aperture 4 therein.

The modification shown in Figure 7 enables the collar 2 to be push-fitted on to the base 1. The collar 2 includes an annular groove 17 extending upwardly from its bottom edge to provide a bifurcated end 18 of increased thickness frictionally engaging an upward annular flange 19 integral with the base 1. Either the groove r the flange may be ribbed to promote a tight fit therebetween.

WHAT I CLAIM IS:—

1. A roof weathering slate comprising a roof flashing having a substantially flat metal base formed so that a pipe protruding from a roof can project therethrough, and a hollow elastomeric collar which is attached to said roof flashing and which, when said slate is mounted on such a roof, establishes a seal around the pipe.

2. A roof weathering slate having a substantially flat metal flashing which is apertured so that the flashing can be mounted on a roof about a pipe protruding therefrom, and a hollow elastomeric collar for sealing around the pipe, said hollow elastomeric collar having at its lower end a radially outwardly extending annular flange and constituting therewith a one-piece moulding making an adhesional bond at said annular flange with the region of said substantially flat metal flashing around the aperture therein.

3. A roof weathering slate according to claim 1, wherein said flashing includes an upward annular flange with which said collar makes an adhesional bond.

4. A roof weathering slate according to claim 1, including a hollow metal section upstanding of and integral with said substantially flat metal flashing, the uppermost extremity of said hollow section being attached to the lowermost end of said elastomeric collar.

5. A roof weathering slate according to claim 4, wherein said hollow section is crimped around a downwardly projecting rib integral with the collar by which to be attached to said collar.

6. A roof weathering slate according to claim 4, wherein said collar includes an annular groove extending upwardly from its bottom edge to provide a bifurcated end frictionally engaging the uppermost extremity of said hollow section.

7. A roof weathering slate according to any of the preceding claims, wherein the axis of said collar is inclined relative to said metal flashing.

8. A roof weathering slate according to claim 7, wherein the collar axis is at an angle of 75° with said metal flashing.

9. A roof weathering slate according to any of the preceding claims, wherein the upper end f said collar lies in a plane perpendicular to the axis of the collar.

10. A roof weathering slate according to any of the preceding claims, wherein said collar includes an integral inwardly directed rib adjacent its upper end to seal against the pipe.

11. A roof weathering slate according to any of the preceding claims, wherein said collar is a one-piece moulding of neoprene.

12. A roof weathering slate according to any of the preceding claims, wherein said flashing is of a malleable metal.

13. A roof weathering slate according to claim 12, wherein said malleable metal is aluminium.

14. A roof weathering slate according to any of the preceding claims, wherein said collar is of frusto-conical configuration.

15. A roof weathering slate according to any of the preceding claims, wherein said collar has lower, intermediate and upper wall regions, said lower wall region being frusto-conical, said intermediate wall region increasing in internal diameter from its junction with said lower wall region, and said upper wall region from its junction with said intermediate wall region decreasing in internal diameter to its uppermost extremity, the internal diameter at said uppermost extremity being less than the internal diameter at the junction of said lower and intermediate wall regions.

16. A roof weathering slate according to claim 15, wherein the junction between said upper and intermediate wall sections constitutes a point of flexure, said upper wall section either deforming locally or about that junction into sealing contact with a pipe when of an external diameter not greater than the internal diameter at the junction between the intermediate and lower wall regions.

17. A roof weathering slate according to claim 16, wherein the junction between said intermediate and lower wall sections also constitutes a point of flexure about which said collar will further deform into sealing contact with a pipe when of an external diameter greater than the internal diameter at the junction between the intermediate and lower wall sections.

18. A roof weathering slate according to any of claims 15 to 17, wherein the internal diameter at the junction between the intermediate and upper wall regions is substantially equal to or slightly smaller than the outer diameter of the largest pipe section for which the slate is designed, and the internal diameter at the junction between the intermediate and lower wall regions is substantially equal to or slightly larger than the inner diameter of that largest pipe section.

19. A roof weathering slate according to claim 18, wherein the internal diameter at the junction between the intermediate and upper wall regions is 4.31 inches, and the internal diameter at the junction between the intermediate and lower wall regions is 4.07 inches, the slate being designed to seal against 4 inch pipe maximum.

20. A roof weathering slate according to any of claims 15 to 19, wherein the internal diameter at the uppermost extremity of said upper wall region is 2.8 inches, the slate being designed to seal against 3 inch pipe minimum.

21. A roof weathering slate substantially as herein described with reference to Figures 1 to 4 of the accompanying drawings.

22. A roof weathering slate substantially as

herein described with reference to Figure 5, Figure 6 or Figure 7 of the accompanying drawings.

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1310003 COMPLETE SPECIFICATION

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Sheet 1

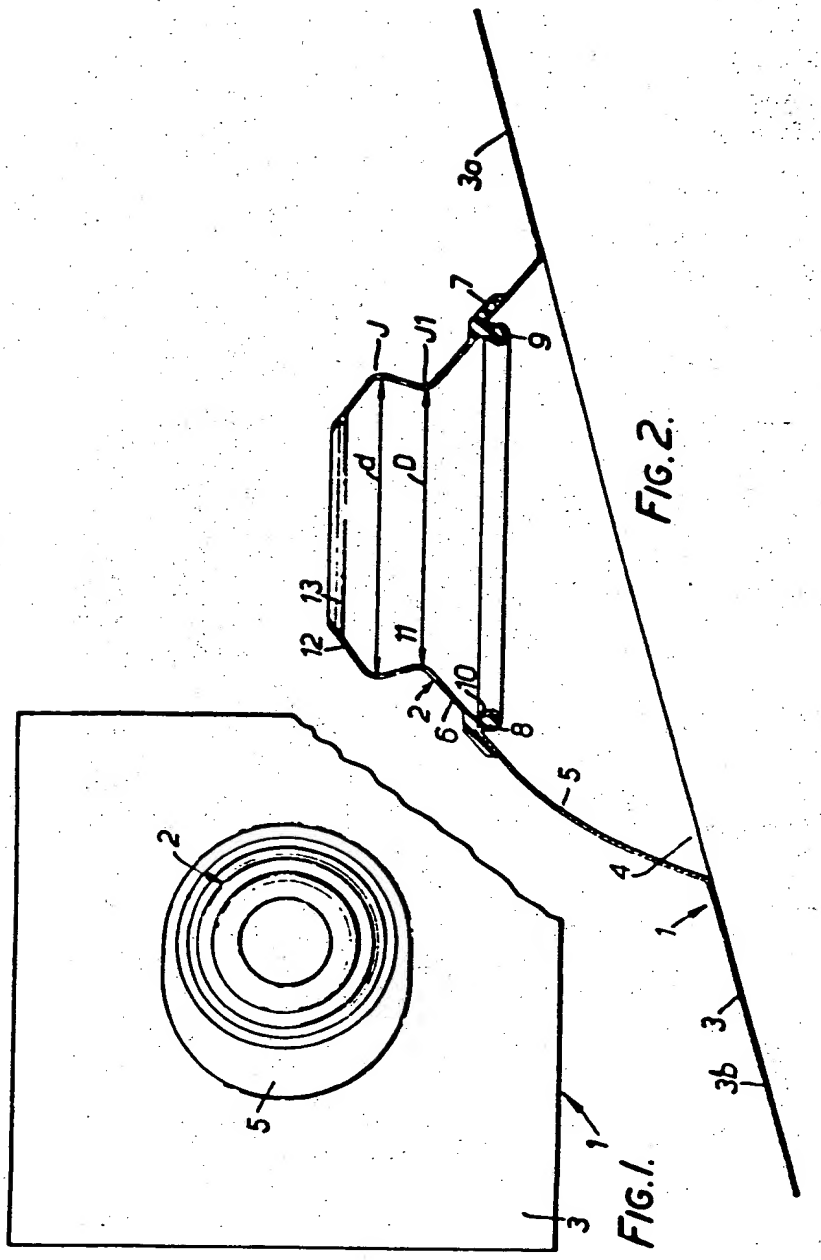

FIG.2.

FIG.1.

1310003 COMPLETE SPECIFICATION
2 SHEETS This drawing is a reproduction of the Original on a reduced scale
Sheet 2

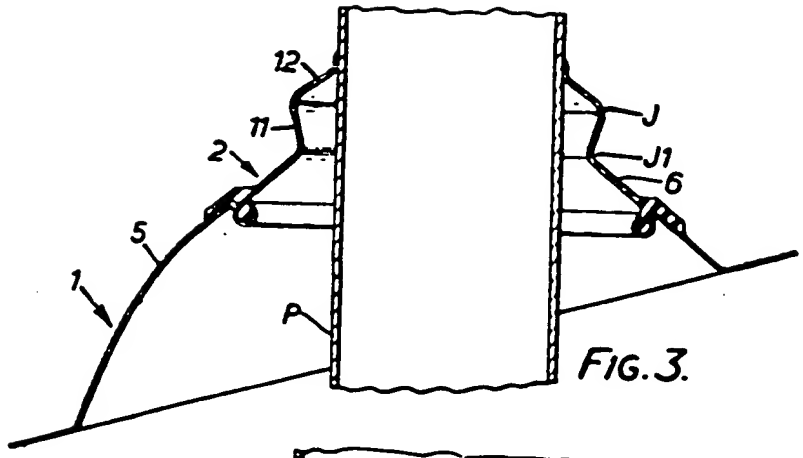

FIG. 3.

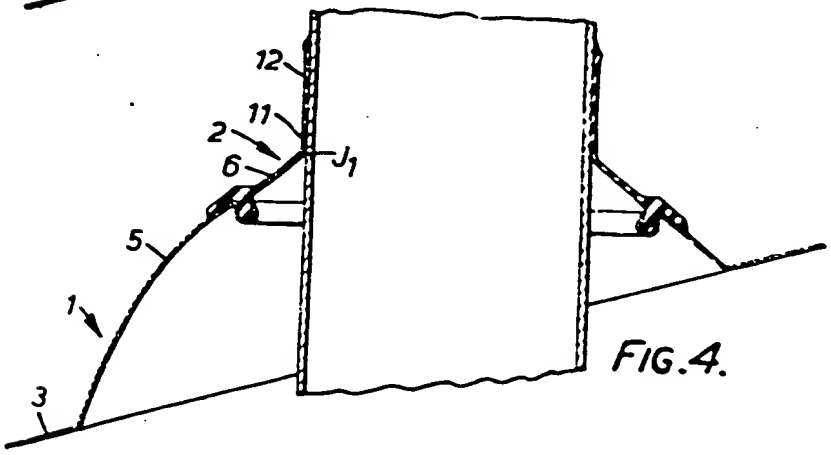

FIG. 4.

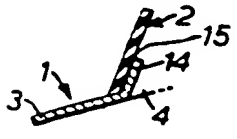

FIG. 5.

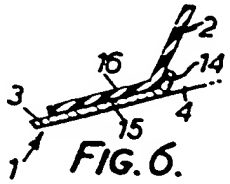

FIG. 6.

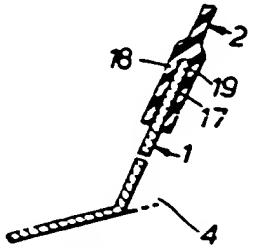

FIG. 7.